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Gray graph as medial graph of a 4-polytope

Each combinatorial polytope of rank 4 which can be assigned Schläfli symbol $\{k, q, k\}$ yields a bipartite k-valent graph, called medial graph of the polytope, whose vertices are the faces of the polytope of ranks 1 and 2. Two vertices of such graph are adjacent whenever the corresponding faces are incident. I shall present recent work with Barry Monson, in which we prove that the medial graph for the polytope with regular toroidal facets $\{3, 6\}_{(3,0)}$ and vertex-figures $\{6, 3\}_{(1,1)}$ is an edge-transitive graph with 54 vertices, known as the Gray graph. In fact, our construction yields an infinite family of edge-transitive graphs which are not vertex-transitive. Gray graph is the smallest known graph with this property.